

CLAIMS

We claim:

- 1 1. A variable waveguide attenuator, comprising:
 - 2 at least one waveguide attenuator cavity;
 - 3 a fluidic dielectric at least partially disposed within at least one subcavity
 - 4 within said waveguide attenuator cavity, said fluidic dielectric having a loss
 - 5 tangent, a permittivity and a permeability;
 - 6 at least one composition processor adapted for changing at least one among
 - 7 an electrical characteristic and a physical characteristic of the variable waveguide
 - 8 attenuator by manipulating said fluidic dielectric to vary at least one of a volume,
 - 9 said loss tangent, said permittivity and said permeability of the fluidic dielectric;
 - 10 and
 - 11 a controller for controlling said composition processor in response to a
 - 12 waveguide attenuator control signal.
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- 1 2. The variable waveguide attenuator according to claim 1 wherein said
 - 2 composition processor selectively varies concurrently at least two among said
 - 3 volume, said loss tangent, said permittivity and said permeability within the at least
 - 4 one subcavity in response to said waveguide attenuator control signal.

- 1 3. The variable waveguide attenuator according to claim 1 wherein the
- 2 waveguide attenuator has an attenuation and said composition processor
- 3 selectively varies said loss tangent to vary said attenuation.

1 4. The variable waveguide attenuator according to claim 1 wherein the
2 waveguide attenuator has an attenuation and said composition processor
3 selectively varies said loss tangent to maintain said attenuation constant as at least
4 one of said permittivity and said permeability is varied.

1 5. The variable waveguide attenuator according to claim 1 wherein the
2 waveguide attenuator has a characteristic impedance and said composition
3 processor selectively varies said permeability to maintain said characteristic
4 impedance approximately constant when at least one of said loss tangent, said
5 permittivity, and said volume is varied.

1 6. The variable waveguide attenuator according to claim 1 wherein the
2 waveguide attenuator has a characteristic impedance and said composition
3 processor selectively varies said permeability to adjust said characteristic
4 impedance.

1 7. The variable waveguide attenuator according to claim 1 wherein the
2 waveguide attenuator has a characteristic impedance and said composition
3 processor selectively varies said permittivity to maintain said characteristic
4 impedance approximately constant when at least one of said loss tangent, said
5 permeability, and said volume is varied.

1 8. The variable waveguide attenuator according to claim 1 wherein the
2 waveguide attenuator has a characteristic impedance and said composition
3 processor selectively varies said permittivity to adjust said characteristic
4 impedance.

1 9. The variable waveguide attenuator according to claim 1 wherein a plurality of
2 component parts are dynamically mixed together in said composition processor

3 responsive to said waveguide attenuator control signal to form said fluidic
4 dielectric.

1 10. The variable waveguide attenuator according to claim 9 wherein said
2 composition processor further comprises a component part separator adapted for
3 separating said component parts of said fluidic dielectric for subsequent reuse.

1 11. The variable waveguide attenuator according to claim 1 wherein said
2 composition processor further comprises at least one proportional valve, at least
3 one mixing pump, and at least one conduit for selectively mixing and
4 communicating a plurality of said components of said fluidic dielectric from
5 respective fluid reservoirs to a waveguide attenuator cavity.

1 12. The variable waveguide attenuator according to claim 1 wherein said fluidic
2 dielectric is comprised of an industrial solvent.

1 13. The variable waveguide attenuator according to claim 14 wherein said
2 industrial solvent has a suspension of magnetic particles contained therein.

1 14. The variable waveguide attenuator according to claim 15 wherein said
2 magnetic particles are formed of a material selected from the group consisting of
3 ferrite, metallic salts, and organo-metallic particles.

1 15. The variable waveguide attenuator according to claim 15 wherein said
2 component contains between about 50% to 90% magnetic particles by weight.

1 16. The variable waveguide attenuator according to claim 1, further comprising a
2 second waveguide filter cavity.

- 1 17. The variable waveguide attenuator according to claim 16, wherein said
- 2 second waveguide filter cavity is at least partially filled with a second fluidic
- 3 dielectric.

- 1 18. The variable waveguide attenuator according to claim 17, further comprising
- 2 at least a second composition processor adapted for dynamically changing a
- 3 composition of said second fluidic dielectric to vary at least one of a volume, a loss
- 4 tangent, a permittivity and a permeability of said second fluidic dielectric.

- 1 19. A method for attenuating an RF signal comprising the steps of:
 - 2 providing at least one waveguide filter cavity within a waveguide;
 - 3 at least partially filling said waveguide filter cavity with a fluidic dielectric;
 - 4 propagating said RF signal within said waveguide; and
 - 5 dynamically changing at least one among a volume and a composition of said
 - 6 fluidic dielectric to selectively vary at least one of a loss tangent, a permittivity and
 - 7 a permeability of said fluidic dielectric in response to a waveguide attenuator control
 - 8 signal.

- 1 20. The method according to claim 19 further comprising the step of selectively
- 2 varying at least two among said loss tangent, said permittivity and said
- 3 permeability concurrently in response to said waveguide attenuator control signal.

- 1 21. The method according to claim 19 further comprising the step of varying
- 2 said loss tangent to vary said attenuation.

- 1 22. The method according to claim 19 further comprising the step of varying
- 2 said loss tangent to maintain said attenuation constant as at least one of said
- 3 permittivity and said permeability is varied.

1 23. The method according to claim 19 further comprising the step of selectively
2 varying said permeability to maintain a characteristic impedance of said waveguide
3 attenuator approximately constant when at least one of said loss tangent and said
4 permittivity is varied.

1 24. The method according to claim 19 further comprising the step of selectively
2 varying said permeability to adjust said characteristic impedance.

1 25. The method according to claim 19 further comprising the step of selectively
2 varying said permittivity to maintain said characteristic impedance approximately
3 constant when at least one of said loss tangent and said permeability is varied.

1 26. The method according to claim 19 further comprising the step of selectively
2 varying said permittivity to adjust said characteristic impedance.

1 27. The method according to claim 19 further comprising the step of dynamically
2 mixing a plurality of components in response to said waveguide attenuator control
3 signal to produce said fluidic dielectric.

1 28. The method according to claim 27 further comprising the step of separating
2 said components into said component parts for subsequent reuse in forming said
3 fluidic dielectric.

1 29. The method according to claim 27 further comprising the steps of selectively
2 mixing said components of said fluidic dielectric from respective fluid reservoirs.

1 30. The method according to claim 19, further comprising the step of providing a
2 second waveguide filter cavity.

1 31. The method according to claim 30, further comprising the step of at least
2 partially filling said second waveguide filter cavity with a second fluidic dielectric.

1 32. The method according to claim 31, further comprising the step of providing
2 at least a second composition processor adapted for dynamically changing a
3 composition of said second fluidic dielectric to vary at least one of a loss tangent, a
4 permittivity and a permeability of said second fluidic dielectric.